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ABSTRACT

This study examines the effects of school racial/ethnic composition upon student achievement. The study was carried out in a middle-sized mid-western city. The population for the project was identified in the fifth grade of this public school district. All students were administered the California Achievement Test 1970 edition during both their third and fifth grade year. The reading vocabulary, reading comprehension, math computation, and language mechanics subtest of this instrument make up the dependent variables. The independent variables are student race (black/white) and the school racial impact level. The racial impact level is defined as being the ratio of black to white students within the school. Examination of the data for variability attributable either to independent variables or interaction effects was carried out through the use of a two-way analysis of variance using a least squares method. Varying relationships between the two independent variables and the dependent variables were noted. The effects of each independent variable was inconsistent upon the mean gain scores recorded for the various subtests. It is speculated that varying emphasis upon different categories of the curriculum could partially account for the differences in mean gain scores among the dependent variables. (Author)

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LONGITUDINAL EFFECTS OF SCHOOL RACIAL/ETHNIC COMPOSITION UPON STUDENT ACHIEVEMENT

FIRST REPORT

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Longitudinal Effects of School Racial/Ethnic Composition Upon Student Achievement

Introduction

The preferred outcomes of schooling are many. Socialization, citizenship, physical skills, life role competencies, fine arts appreciation, possibly foreign language ability, and certainly a demonstrated acquisition of basic skills in reading, math and language are among understandings and skills deemed preferable by most consumers of public education. In an earlier effort involving the prioritizing of educational goals by all community groups, a high degree of concordance was reported regarding the acquisition of basic skills (Thompson and Smidchens, 1977). Few in our society would disagree with the need for all to possess at least minimal ability to compute, read, and write.

Much concern has been expressed since the 1960's (Coleman, 1966) that many students have not acquired these basic skills. The issue of segregation/desegregation has drawn attention to the acquisition of basic skills since it was ruled that separate schools for the races denied equality of educational opportunity for black children. Since that period, numerous studies have attempted to examine the question of black/white basic skill achievement pre-post desegregation efforts. These efforts, however, generally have suffered from design problems (Bradley and Bradley, 1977) leading to the conclusion "that the data collected since 1959 regarding school desegregation has been inconsistent and inadequate". Further, the current authors were unable to locate previous efforts which linked student achievement or test scores with the degree of desegregation. That is, earlier studies do not appear to have considered the percentage of minority students in a school population as a variable in the examination of desegregation

effectiveness as expressed in student achievement levels. It appears that desegregation has been defined as an effort which results in the proportion of black and white students being more nearly equal in a given school than was previously the case. Repeated findings indicate that black achievement is higher in predominantly white schools (Crain and Mahard, 1977) yet the operational definition of the term predominantly white is lacking. The assumption must be made that any population in excess of 50% of students of either race is to be considered to be "predominant".

The authors' basic objective was to define schools within narrower ranges of racial predominance and to examine the basic skill achievement gain of students within these ranges of schools. The questions for which a response is intended are as follows:

> Do white students gain in basic skill achievement at different rates in schools of varying racial impact level (RIL)?
>
> Do black students gain in basic skill achievment at different rates in schools of varying racial impact level (RIL)?

Project Description

The locale for this effort was a midwestern city with a population of approximately 100,000 and a public school student population of 15,000-20,000. Being the site of a major university, the population must be considered atypical, at least in terms of community education achievement. The student population is made up of 17.5 percent ethnic minority members, 13.9 percent of which are black. The next largest minority sub-group is Asian-American which comprises two percent of the student population.

The population for this study is made up of all fifth graders in the district. Only those students who had also been enrolled in the school system for their third grade year were included in the sample. The size of this group is approximately 800 or two-thirds of the total study population. Of this sample, 85 percent are white and 15 percent are black.

There are twenty-six elementary schools in the school district. These schools have been categorized into four racial impact levels (RIL). These RIL were determined according to the percentage of minority group (black) students within each school population. There are fourteen schools in RIL I. These schools have ten percent or fewer minority students. Five schools make up RIL II. These have minority populations of 11-20 percent. The four schools in RIL III have minority student populations of 21-30 percent. RIL IV is made up of schools with minority populations of 30-55 percent. It should be noted that these varying levels of RIL are the result of "natural desegregation" which is largely the result of the assignment to neighborhood schools of students from mixed racial neighborhoods. Crain and Mahard (1977) define this type of effort as "input-output" research and note that the evaluation is of the effect of rather long-term desegregation which is largely unaffected by public controversy.

The independent variables in this study are the school RIL and student race. Race is dichotomized into black and white students. The dependent variables are the achievment gain scores reported for the sample.

The population was tested during their third grade year using the California Achievement Test 1970 edition, level 2A. Testing took place two years later again with the CAT-70 level 3A. Students who had taken part in both efforts were identified for the sample. Non-black minority students were not included in the study sample. This group made up less than five percent of the identified students.

Using expanded scale scores labeled Achievement Development Scale Scores (ADSS) which were developed by the test manufacturer, CTB/McGraw-Hill, it was possible to determine student gain scores. Data presented in this report are expressed in the form of ADSS gains of scores recorded at grades 3.1 and 5.1. Thus it became possible to draw conclusions relative to the growth rate in basic skills over the period of time included in this first report (Tiegs and Clark, 1974). The authors anticipate conducting repeated measures as this group of students proceed through their academic careers.

Data Analysis

Examination of the data for variability attributable to either of the independent variables or interaction effects was carried out through the use of the two-way analysis of variance utilizing a least squares method. The outcome of these analyses based upon the dependent variables reading, vocabulary, reading comprehension, math computation, and language mechanics are reported in this paper. Again, the reader is advised that mean achievement growth values are expressed in terms of expanded scale scores known as Achievement Development Scale Scores by the CTB/McGraw-Hill Company. Data were collected through the use of the California Achievement Test, 1970 edition.

In the following sections of tables the relationship between the independent and dependent variables utilizing the two-way analysis of variance model is examined. Significant comparisons were noted at the .05 level for committing type I error.

Student Race and School Racial Impact Level as Independent Variables

Reading Vocabulary

Table I contains reading vocabulary data for student race and school RIL groups. A statistically significant difference was noted in the growth values on the main effect of race. The other main effect of school RIL along with the interaction effect failed to produce significant results. White students recorded higher growth scores than did black students. The school RIL was not found to have an effect upon the test scores.

Table 1

Reading Vocabulary Achievement Considered With
Student Race and School Racial Impact Level

Student Race		School Racial Impact Level			
		RIL I	RIL II	RIL III	RIL IV
Black	N	22	12	32	49
	M	61.3	64.0	50.5	62.9
	SD	38.7	46.5	50.6	50.4
White	N	437	121	90	30
	M	79.0	85.5	76.1	63.1
	SD	46.5	45.3	54.8	59.1

Least Squares ANOVA

Source	df	MS	F	Prob.
School RIL	3	3256.3	1.4	.24
Race	1	19928.7	8.6	.003
Interaction	3	2379.9	1.0	.38
Within	785	2309.67		

Reading Comprehension

Summary data on reading comprehension by student race and school RIL are presented in Table 2. Statistically significant differences were observed in means of the gain scores among the four Racial Impact Level groups. The other main effect, student race, did not produce significant results. The same was true of the interaction effect. White students and black students did not have significantly different means in reading comprehension. The gains recorded on the mean effect of school RIL were puzzling and mixed. Students in RIL IV schools scored higher than students in any other level. Students in RIL III as a group scored lower than all others.

Mathematics Computation

Table 3 contains the data summary of the dependent variable, math computation, by school RIL. The impact of both main effects was found to be statistically significant. Level of growth on the dependent variable was significantly different between black and white students as well as between students who attend schools of varying RIL. White students scored higher than black students. Students attending high RIL schools scored lower than their counterparts although once again the data did not follow a linear progression through the racial impact levels. A peak in the data was noted at RIL III. No interaction effects were noted.

Language Mechanics

Table 4 examines data in the area of language mechanics. Neither of the main effects produced statistically significant differences. The same was true of the interaction effect. The school Racial Impact Level had no impact upon student achievement in language mechanics. While not statistically significant, the difference in student achievement on the race factor could be referred to as a trend. The direction of this trend would seem to indicate that white students are beginning to record higher growth scores than black students.

Table 2

Reading Comprehension Achievement With

Student Race and School Racial Impact Level

Student Race		School Racial Impact Level			
		RIL I	RIL II	RIL III	RIL IV
Black	N	22	12	32	51
	M	82.8	102.7	83.8	104.8
	SD	55.5	69.3	55.3	66.4
White	N	437	121	88	31
	M	96.3	92.8	85.6	118.9
	SD	59.0	49.3	55.6	78.4

Least Squares ANOVA

Source	df	MS	F	Prob.
School RIL	3	11278.0	3.3	.02
Race	1	3230.4	0.9	.33
Interaction	3	1857.0	0.5	.65
Within	786	3428.8		

Table 3

Mathematics Computation Achievement With

Student Race and School Racial Impact Level

Student Race		School Racial Impact Level			
		RIL I	RIL II	RIL III	RIL IV
Black	N	22	11	31	46
	M	85.0	88.4	90.8	80.7
		27.2	35.7	37.5	42.5
White	N	437	118	89	32
	M	94.6	97.9	110.5	83.5
		36.9	39.0	43.5	32.7

Least Squares ANOVA

Source	df	MS	F	Prob.
School RIL	3	7884.7	5.4	.001
Race	1	8852.2	6.1	.01
Interaction	3	1027.9	0.7	.55
Within	778	1448.1		

Table 4

Language Mechanics Achievement With
Student Race and School Racial Impact Level

Student Race		School Racial Impact Level			
		RIL I	RIL II	RIL III	RIL IV
Black	N	21	12	29	42
	M	108.7	92.1	77.4	86.6
	SD	64.9	35.6	61.3	75.6
White	N	435	118	87	29
	M	105.8	106.7	103.7	91.2
	SD	57.3	56.3	54.9	71.7

Least Squares ANOVA

Source	df	MS	F	Prob.
School RIL	3	2941.3	0.9	.46
Race	1	8120.2	2.4	.13
Interaction	3	3260.8	1.0	.42
Within	765	3345.8		

Conclusions

Clear and precise observations regarding the data are difficult to arrive at in this study. On two of the dependent variables, reading comprehension and math computation, the data regarding school Racial Impact Level indicate a significant relationship. On the two remaining, reading vocabulary and language mechanics, no relationship is present. The independent variable of student race is significantly related to growth on the dependent variables of reading vocabulary and math computation, but no relationship is noted to the growth in reading comprehension. Only a trend toward a relationship is observed between race and dependent variable language mechanics. None of the interaction effects approached a significant magnitude.

School Racial Impact Level has an effect on the recorded growth of students in a few curriculum areas. However this effect is not clearly directional. That is, students from RIL I do not necessarily report the highest growth, with RIL II next, RIL III next, and finally RIL IV. The relative position of students from each RIL varies with each dependent variable. Students, both black and white, from schools in RIL IV demonstrated the highest gain in reading comprehension. There may be logical reasons for this finding. Racial Impact Level IV schools generally are the lowest in the district in terms of parental socio-economic status. As a result, these schools have been the primary recipients of special category funds (i.e. E.S.E.A. Title I) which have focused special attention upon basic skill mastery. In an earlier study (Thompson and Smidchens, 1977) the Board of Education received data which identified language arts skills as the number one priority of the district. Based upon these data, the decision was made to commit an additional significant portion of the budget to the development of reading skills. Again, special attention was focused upon the RIL IV schools since their relative rank, in terms of national percentiles, in the district was near the bottom of all elementary schools. School academic climate has been demonstrated to be a critical factor in student achievement (Brookover, 1977). Though lacking data on the topic, the present authors have noted the reputations

throughout the district of the principals and staffs of these RIL IV buildings. They are known as committed, energetic professionals who reject the hypothesis that lower socioeconomic students learn at lower rates. They are reported to hold high academic expectations for students. Talking with them leads to the belief that they press hard for parental involvement in the schooling process.

White students scored significantly higher than black students in growth on the math computation dependent variable. School Racial Impact Level was also significantly related to growth on this variable. The finding that white students score higher than black students on a standardized norm referenced instrument is not uncommon. However, the observation that both black and white students gain at a faster rate as RIL increases appears to be counter to most data which have been presented. That is until the data for RIL IV are noted. The sharp decline in math computation growth from RIL III to RIL IV appears inexplicable unless one concludes that the known instructional concentration upon reading skills has brought about a shift in emphasis away from the math area. Building staff generally are not of the opinion that this was true, however. Additional data are not available at this time.

The need for more information is apparent. The authors currently are developing a format which would allow for the collection of data designed to assist in the explanation of these gain scores. These added variables are expected to include the mean socioeconomic status of the school, school personnel data, self-concept measures, school organization format, parental involvement, staff satisfaction information, as well as staff beliefs and expectations. The second phase of this study is scheduled for 1981, the point at which these students will be eighth graders.

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